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(58) Field of search
B5B

(54) Apparatus for heat-shrinking thermoplastic sleeves about containers

(57) Apparatus is described for applying heat-shrinkable plastic sleeves to containers and the heat-shrinking of the sleeves while the containers are transported through an arcuate set of infra-red heaters 66,67 having temperature controlled zones. Complete shrinkage of the sleeves into contact with the underlying annular surface of the bottoms of the containers is assured by means of a hot air impingement manifold 105 positioned adjacent the path of travel of the containers. Containers are fed by a conveyer 10 through a preheat oven 11 to an inlet storwheel 13 which feeds the containers in series to a rotatable turret having chucks for engaging the container necks. The plastic sleeves are wound on mandrels 77 located below the turret and pushed upwardly to surround the containers as each container approaches the heaters 66,67,105. An outlet storwheel 68 feeds the sleeved containers to a discharge conveyer 72.

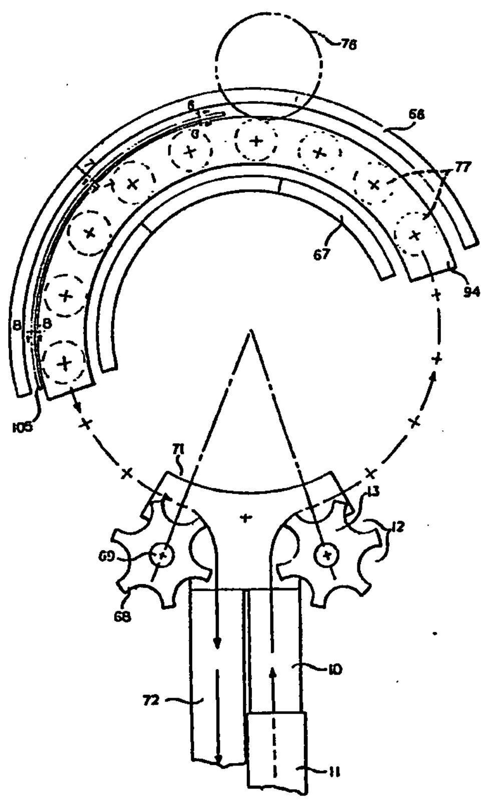

FIG. 5

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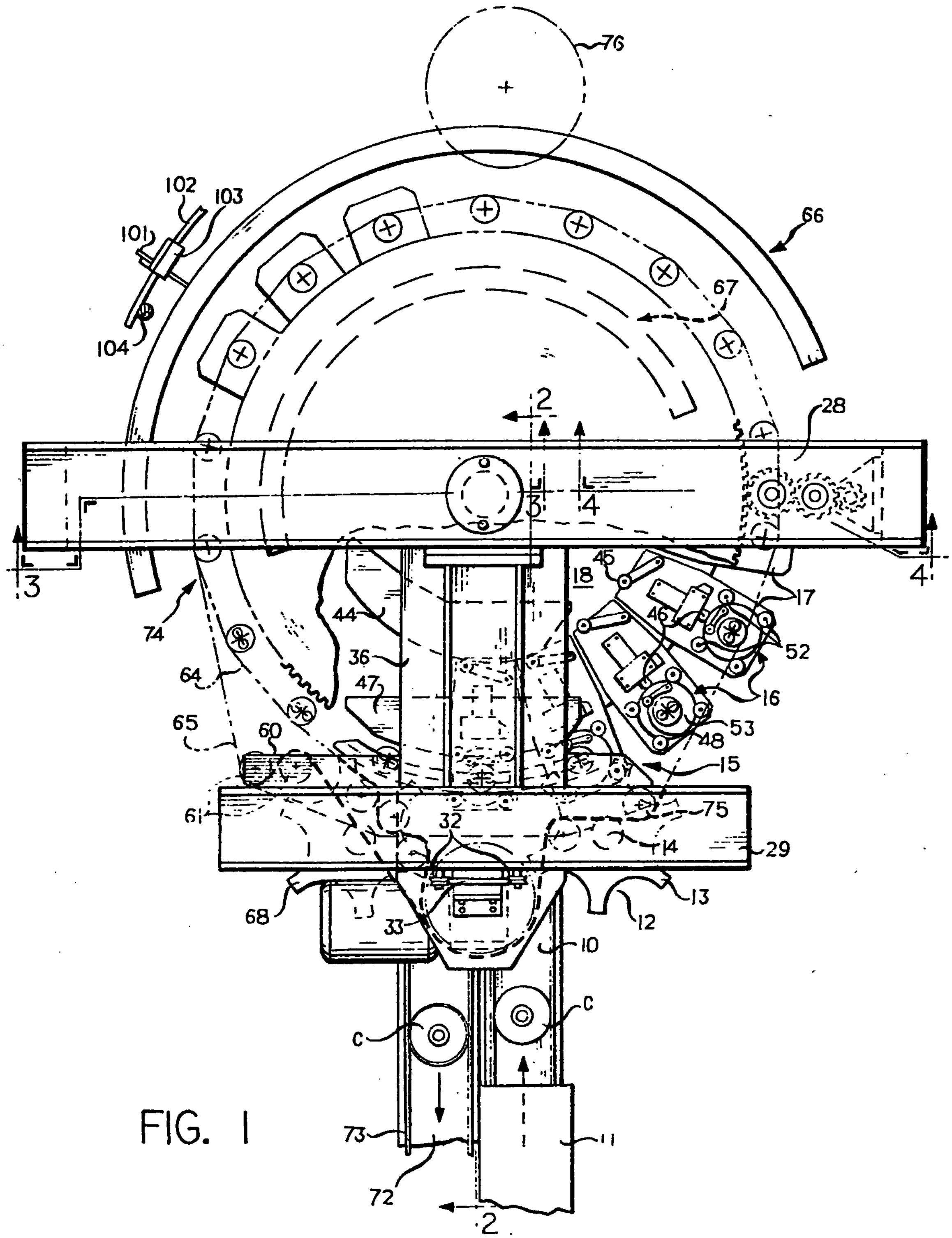
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FIG. 1

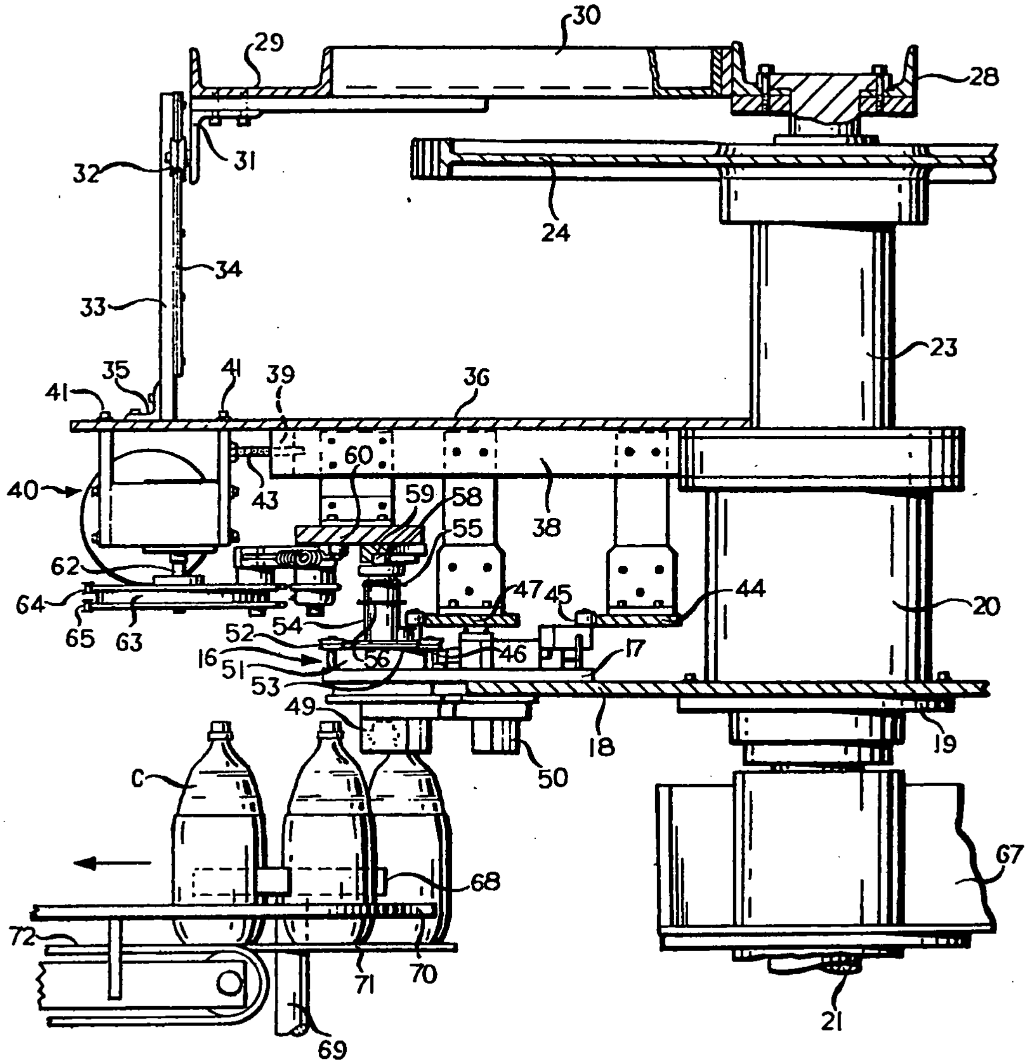
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FIG. 2

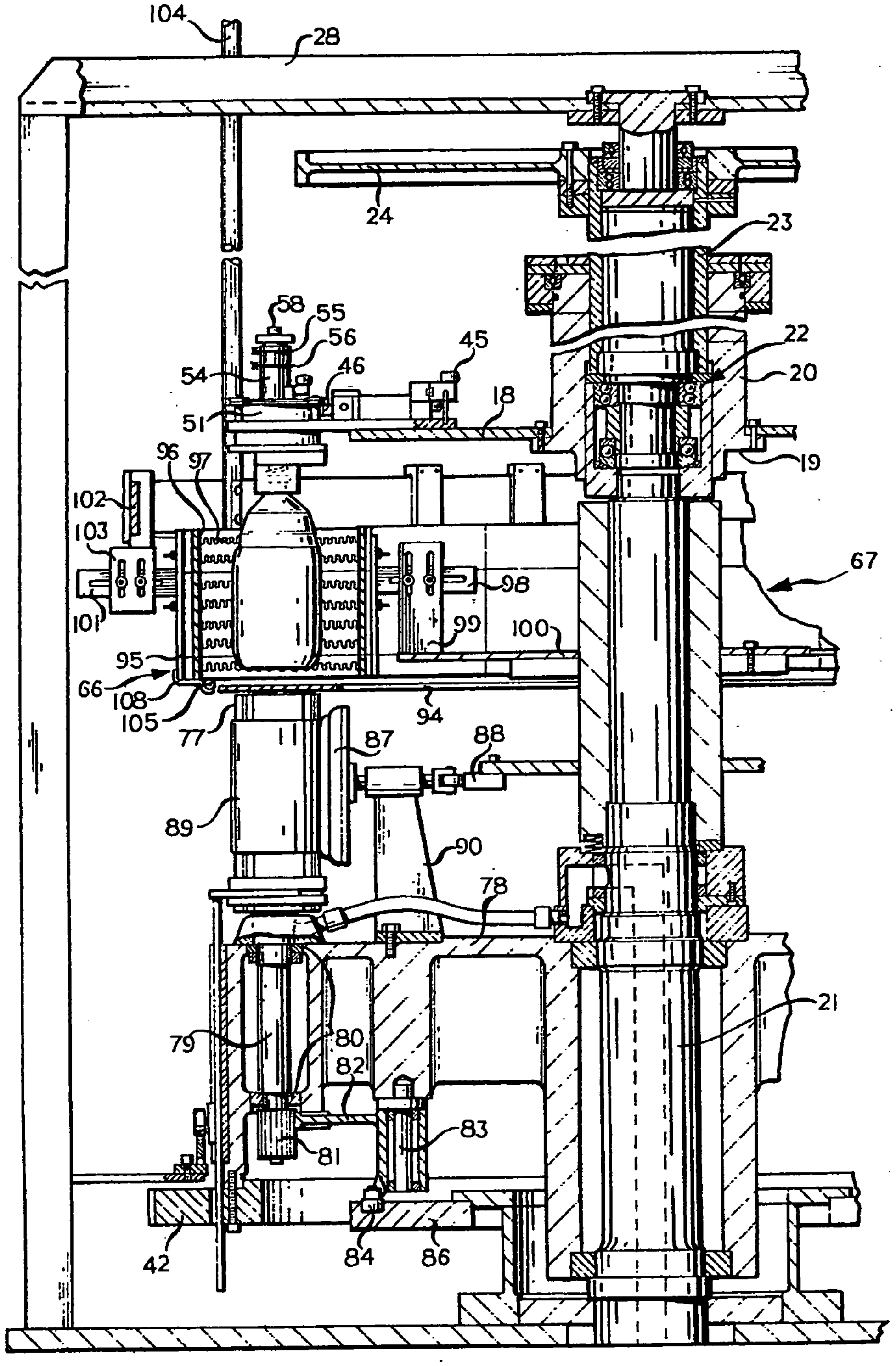
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FIG. 3

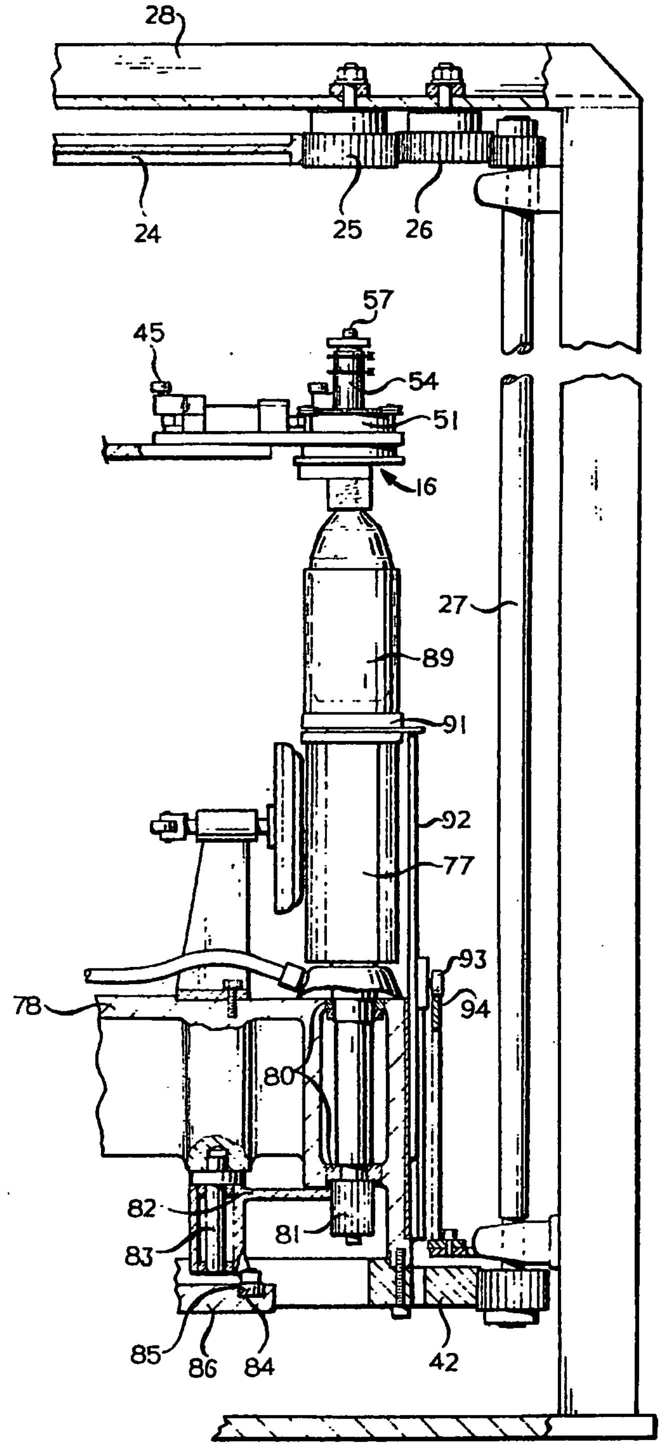
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FIG. 4

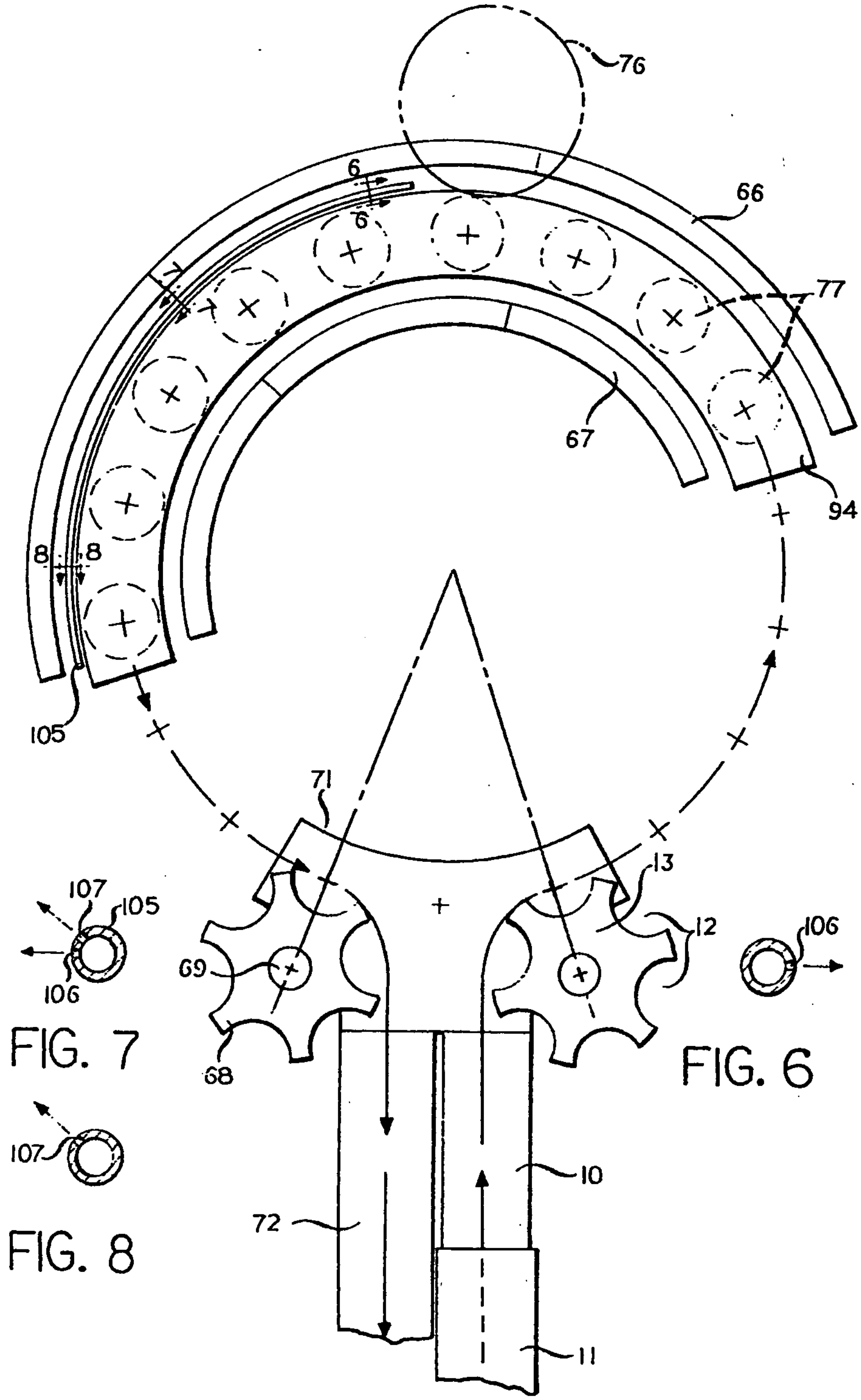

FIG. 7

FIG. 6

FIG. 8

FIG. 5

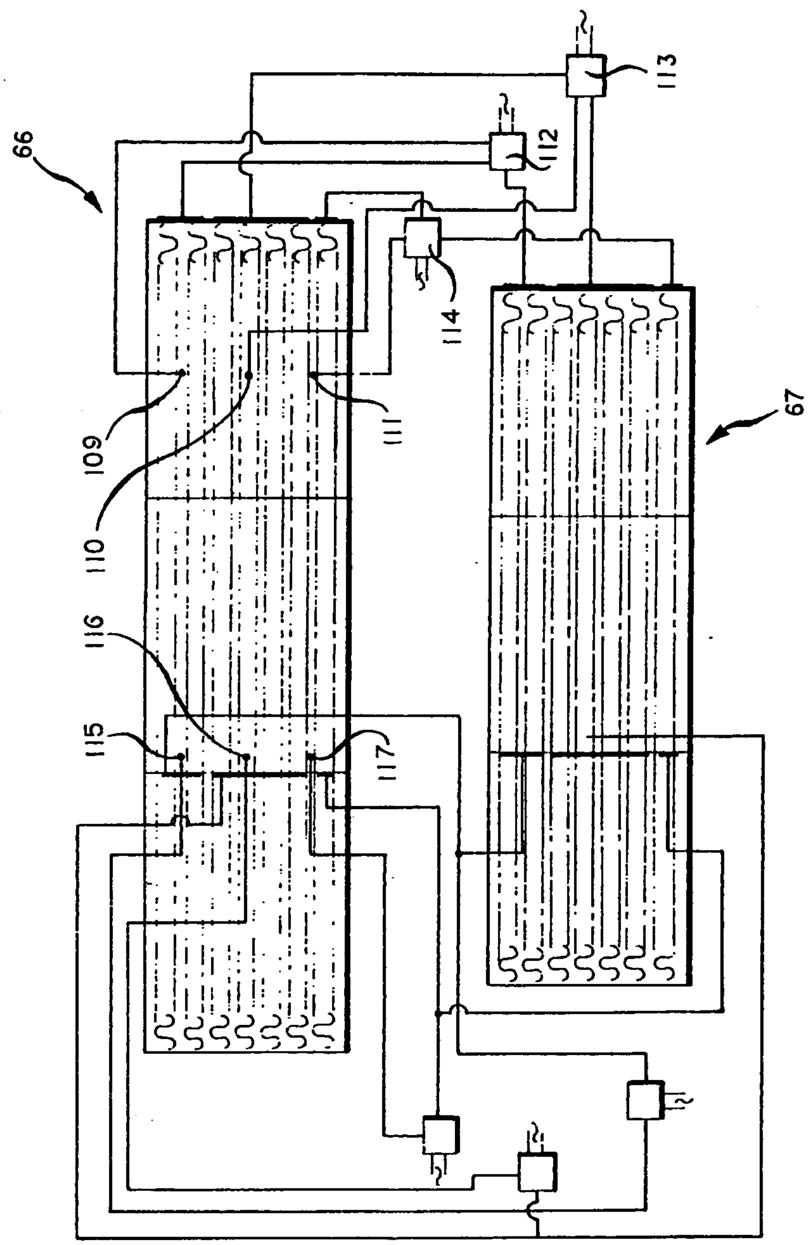

FIG. 9

SPECIFICATION

Apparatus for heat-shrinking thermoplastic sleeves about glass containers

The present invention relates to a machine for receiving preheated glass containers moving in an upright attitude on a conveyor belt which moves the containers in series into a machine for grasping the necks of the containers. The machine then takes the containers held by their necks and conveys them through approximately 320° of movement about a central vertical axis. During movement through this circular path, the container will receive a thermoplatic shrinkable sleeve thereabout and the sleeve will be shrunk about the container, and then the container with the applied sleeve will be released to move on an outgoing conveyor belt similar to the incoming belt.

Background of the invention

It has been the practice in the past to provide apparatus to form a sleeve of thermoplastic material on a series of rotatable sleeve-forming mandrels that are carried on a circular turret, for example, as shown in U.S. Patent 3,802,942 issued April 9, 1974. This patent discloses the process of forming sleeves from the point where a foamed material is extruded as a tube, then slit into a flat sheet. The sheet is provided with a stretch orientation in the direction of its width by reason of its being inflated as it is extruded in tube form. The inflation of the tube stretches the tube in a circumferential direction, and this provides the built-in shrinkage characteristic which is desired. Thus, when the material is formed into a cylinder with the direction of shrink extending circumferentially about the cylinder and this cylinder or sleeve is then applied to the container, heating of the sleeve will shrink the sleeve into conformity to the external surface of the container.

The method and apparatus for producing the shrink sleeves of the present invention is essentially the same as that disclosed in the above-referred-to U.S. Patent 3,802,942, and reference to such patent may be had and the disclosure of this patent is incorporated herein by reference. Figures 1 and 2 of this patent show two essentially similar systems, in plan view, wherein sleeving material 15a is brought into association with preheated containers at the turret 58. At turret 58, the material is formed on mandrels into sleeves and then put onto glass containers, and the containers with the sleeves thereon exit from the mandrel and pass through a heat-shrink oven 77 on their way to an exit conveyor 81. The newly formed or preheated containers are picked up at the end of a feed screw 53 in both Figure 1 and Figure 2 embodiments of this patent. It should be pointed out that in this patent the containers, at the point of pickup and throughout their entire travel through the ovens and the sleeving operation, are carried by an individual set of tongs carried on an endless chain-drive system. There are as many tongs as there are positions along the length of the chain used to convey the bottles. The bottles are spaced apart a fixed distance, depending on the spacing of the tongs. Thus, the above-referred-to patent discloses an endless pair of chains carrying a series of neck-grasping chucks for holding the necks of the containers through the cycle of operation of preheating the containers, applying a shrinkable sleeve to the container and subsequently heat-shrinking the sleeve that has been applied to the container. It will be noted that in this patent the shrinking of the sleeve takes place in a long, straight line moving away from the turret where the sleeves have been formed and applied to the container. This patent also provides a clear teaching of a bottle-handling system where a relatively tall set of tong-transporting mechanisms are used to pick up the containers, on the fly, and to drop the containers, on the fly, with the tong mechanism having the ability to be raised and lowered and opened and closed while moving in the straight line motions.

The heat-shrinking of sleeves on containers while being transported about the axis of the sleeve forming and assembling turret is disclosed in copending application Ser. No. 8413863 (Attorney Docket No. 14813), assigned to the assignee of the present application. This application is generally drawn to the method of heat-shrinking sleeves on bottles while they are moved about the center of the turret. The present invention being considered is an improved, detailed apparatus for carrying out the method disclosed therein.

Summary of the invention

In contrast to the foregoing, it is an object of this invention to provide apparatus for handling containers which are moved into the apparatus while carried on a conveyor to be grasped by a chuck mechanism supported by a chuck holder, of which there are as many chuck holders as there are positions about the turret of the handling system.

It is a further object of this invention to provide a system for handling a plurality of containers in succession through a series of positions where the containers will receive shrinkable sleeves thereon, and the containers will have the sleeve shrunk thereon while they are still within the relatively short transport period from the entrance to a rotating turret to the exit from the rotating turret. During the transport of the containers, the sleeves will be shrunk in place and the containers will be handled in an expeditious and relatively speedy simplified handling system.

It is another object of this invention to provide a more compact sleeve-applying and shrinking system than that disclosed in the prior art and provide a mechanism for carrying out such a system with adequate controls.

Other and further objects will be apparent from the following description taken in conjunction with the annexed sheets of drawings.

Brief description of the drawings

Figure 1 is a schematic plan view of the apparatus of the invention;

Figure 2 is a cross-sectional view taken at line 2-

2 on Figure 1, of the upper portion of the machine only, on an enlarged scale;

Figure 3 is a cross-sectional view taken at line 3-3 of Figure 1 on an enlarged scale;

Figure 4 is a cross-sectional view taken at line 4-4 of Figure 1 on an enlarged scale;

Figure 5 is a schematic, plan view of the apparatus of the invention illustrating the position of the shrink ovens and hot air delivery system;

Figures 6, 7 and *8* are cross-sectional views through the hot air manifold, on an enlarged scale, at three indicated locations in the length of the manifold of Figure 5; and

Figure 9 is a schematic diagram of the heaters and their controls.

Detailed description of the drawings

With reference to Figures 1 and 2, the apparatus of the invention will be described in conjunction with the application of a sleeve of shrinkable plastic material to a container. The emphasis in the present application is on the mechanism for shrinking sleeves on the bottles as they are carried through the system, and in particular, the details of the heaters and control thereof.

With particular reference to Figure 1, which is a plan view of the overall apparatus utilizing the invention, it can be seen that glass containers C positioned upright on a moving conveyor 10 are shown exiting from a preheat oven 11. As the containers move in the direction of the arrow shown at the bottom of Figure 1, they will be carried by the conveyor 10 into and be engaged by pockets 12 of an inlet starwheel 13. The starwheel 13 is mounted to and rotates about a vertical axle 14. The bottles or containers C, as they are moved by the starwheel 13, will be moved into a position referenced 15 in Figure 1, at which time the bottle will be grasped by its neck by a chuck mechanism, generally designated 16. As can readily be seen when viewing Figure 1, there are a plurality of chuck mechanisms, only a few of which are shown in any detail. In actual fact, there are eighteen chuck mechanisms in the apparatus illustrated in Figure 1. The details of the chuck mechanism will be explained later. Each of the individual chuck mechanisms 16 is mounted on a generally horizontal plate 17. The eighteen plates 17 are mounted on a circular plate or disc 18. The disc 18, as perhaps best shown in Figure 2, is mounted to an annular ledge 19 of a central hub 20. The hub 20 is rotatably supported relative to a vertical shaft 21 by suitable bearings 22 shown in Figure 3. The hub 20 and the vertical cylinder 23, to which it is fixed, is driven from above by a large diameter bull gear 24. The bull gear 24, as best seen in Figure 4, is driven by a pinion 25, which in turn is driven through an idler gear 26. The gear 26 is driven by a spur gear at the upper end of a shaft 27, which may be driven by a motor (not shown). The main central support shaft 21, which is stationary, extends vertically upward through and coaxial with the cylinder 23, and at its upper end is bolted to a cross beam 28. At the same elevation as the cross beam 28 and parallel thereto is a shorter beam 29. The beams 28 and 29 are fixed relative to each other by an overhead support member 30. The beam 29 at its one edge carries an angle bracket 31. The bracket 31 in turn carries and supports a pair of spaced-apart guide roller devices 32 similar in configuration to pulleys. The rollers 32 serve as reinforcing guides or steadying devices for a vertically upstanding bar 33, which has an edge plate 34 riding between the rollers 32. The bar 33 at its lower end is connected by an angle bracket 35 to a drive motor and cam plate supporting platform 36. The platform 36 extends outwardly from the cylinder 20. However, since the cylinder rotates and the platform 36 does not, bearings are provided between the two. The under side of the platform 36 carries a pair of parallel downwardly-extending bars 38 bolted thereto. A cross bar 39 extends between the ends of the bars 38 that are remote from the hub. The platform 36, at its extended end as viewed in Figure 2, has a combined gear box and motor unit 40 bolted to the under surface thereof by a set of bolts 41 extending through elongated slots therein. An adjusting screw 43 extends between the unit 40 and the bar 39. In addition to the unit 40 being suspended from the under surface of the platform 36, the platform also supports a first stationary cam plate 44, whose function is to engage a follower 45 which in turn biases a detent 46 toward a slot provided in the outer hub portion of the chuck mechanism 16. The platform 36 also supports a second cam plate 47. The fixed cam plate 47 is positioned to be engaged by a follower 48. The follower 48, when engaged with the cam 47, will open the jaws 49 and 50 of the chuck mechanism 16.

The jaws 49 and 50 are mounted to the lower portion of a generally circular hub 51 of the chuck mechanism 16. The hub 51 extends through and is mounted for rotation relative to the horizontal plate 17 by the fact that the plate 17 supports four equi-spaced pulley-like rollers 52. In configuration, the rollers 52 are similar to the rollers 32 previously described. The rollers 52, however, are engaged by a circular plate or disc 53, whose outer peripheral edge is sharp and therefore engages within the crevices of the rollers 52. In this manner, the hub 51 and the jaws which are supported from the hub are rotatable relative to the plate 17 and the disc 18, which supports all of these mechanisms. Extending vertically above the hub 51 and coaxial therewith is a shaft 54. The shaft supports, coaxially with respect thereto, a pair of spaced-apart sprockets 55 and 56. Above the sprockets 55 and 56, the shaft 54 supports a pair of cam follower rollers 57 and 58. The cam follower rollers 57 and 58 engage a third cam 59. The cam 59 is supported from a horizontal plate 60 which in turn is supported beneath the platform 36. Not only does the plate 60 support the cam 59, but also supports a plurality of shafts to which are mounted a plurality of idler sprockets 61, which are described in greater detail in copending application Ser. No. 8417871 (Attorney Docket No. 15758) in conjunction with Figures 3-5 thereof.

The motor and gear box unit 40 has a down-

wardly-extending output shaft 62 to which a large diameter dual sprocket 63 is connected. The dual sprocket 63 is in engagement with a pair of endless chains 64 and 65 schematically shown in Figure 1. The chains 64 and 65 engage the sprockets 55 and 56 on all of the chuck mechanisms when the chuck mechanisms are outside of the zone of the cams 44, 47 and 59. Thus, the two chains drive and rotate the chuck mechanism 16 throughout generally 240° of the movement of the chucks about the central axis of the shaft 21. The rotation rate may be adjusted as desired and is related to the overall machine speed.

It is during this movement that the sleeves are assembled onto the bottles and are shrunk by the influence of the radiant heaters 66 and 67. The heaters 66 and 67, of which there are three arcuate sections to each, extend approximately 180° about the circumference of the path of travel of the containers when being moved by the mechanism of the invention, as schematically illustrated in Figure 5. The heaters 67 (only partially shown) are positioned within the circumference of the bull gear 24, and thus are only shown in a small section as dotted relative to the path of travel of the containers in Figure 1. The heaters 67, of which there are three in number, match the circumferential degree of coverage of the heaters 66. Thus, the containers with the sleeves applied thereto are rotated about their vertical axes in the chucks 16, as they are moved between the two sets of heaters 66 and 67, to effect the shrinkage of the sleeves to the contour of the exterior of the bottles. When the containers have moved through the zone between the heaters, they will be stopped in their rotation by the fact that the drive chains 64 and 65, and in particular chain 65 which is the lower of the two drive chains, will be guided away from engagement with the sprocket 56 of the heads or chucks 16 as they approach the bottle release point. This release point will occur when the container carried by the chuck has approached and is to be engaged by an exit starwheel 64. This position is indicated by the position of the container to the right as viewed in Figure 2. The starwheel 68 is driven through a support shaft 69, which is rotated by a lower ring gear 42. The containers C, as they exit in the pockets of the starwheel 68, are guided by a curved rail 70 as the bottles slide over the bottom plate 71. The plate 71 is stationary and located opposite the ends of the incoming conveyor 10, as well as opposite an exit conveyor 72. The conveyor 72 is driven in the direction of the arrow shown thereon in Figure 1. A second guide rail 73 overlying the exit conveyor 72 guides the finished, sleeved containers away from the sleeving apparatus.

As previously explained, both the chains 64 and 65 engage the sprockets 55 and 56, respectively, of all of the chucks 16, particularly during the movement of the chucks through the zone of the heaters 66 and 67, at which time the chains will cause the chucks to rotate about their vertical axes. It should be kept in mind that the follower rollers 57 and 58 at this time are free and clear of the cam 59. It should be pointed out, however, that the chain 65, which is the lower of the two chains, leaves the sprockets 56 at the position indicated by the arrow 74 on Figure 1. The chain 65, after leaving the sprocket of the chuck mechanism, is threaded about a pair of idler sprockets 61, and then about the lower run of the dual sprocket 63 driven by the motor unit 40. After passing about the dual sprocket 63, the chain 65 is guided about a second pair of sprockets 75, which are dual in nature, and the chain continues on toward the right side of the mechanism and resumes contact with the sprockets carried by the chuck mechanism 16 after they have passed out of the zone of influence of the cams 44, 47 and 59. In the same manner, but at a different position, the chain 64 leaves the path of the travel of the chuck mechanism 16 and is guided over a series of idler sprockets, and in turn, after passing over the upper run of the dual sprocket 63, will engage the pair of sprockets 75 and return to engage the chuck mechanism 16 along the same path as the chain 65. The details of the chain drive and the sprockets associated therewith are clearly set forth in copending application Ser. No. 8417871 (Attorney Docket No. 15758).

The significant factor in the present invention is the ability of the heat-shrinking system and the heaters 66 and 67 to shrink the sleeve on the containers during the short run of the containers through the arc of the handling turret previously described. The thermoplastic shrink material, of which the sleeves that are applied to the bottles are formed, is cut into individual lengths and transferred to the surface of a drum 76. This upright cylindrical drum 76, shown in phatom line in Figures 1 and 5, will carry the individual strips of material to an oppositely positioned winding mandrel 77. The mandrels 77 are carried about the axis of the shaft 21 on a turret 78. Needless to say, there are eighteen mandrels 77 mounted at equi-spaced positions about the circumference of the turret 78. Each of the mandrels is mounted on a vertical shaft 79 supported by bearings 80 in vertical openings formed in the turret 78. The ring gear 42, as shown in Figures 3 and 4, is bolted to the lower portion of the turret 78, and thus the turret 78 will be rotated by the shaft 27 in synchronism with the bull gear 24, which is rotating the chuck-supporting mechanism above.

Thus, it can be seen that the chucks and the mandrels rotate in vertical alignment with each other throughout the entire rotation of the mechanism. The lower end of each shaft 79 is provided with a pinion gear 81. These pinion gears are in mesh with an individual sector gear 82. The gear 82 is rotatably supported by a pivot pin 83 secured to the lower portion of the turret 78. Each sector gear 82 has a cam follower 84, which rides in an annular track 85 of a box cam 86. The box cam 86 is stationary, and as the turret is rotated, the cam track radius moves toward and away from the axis of the shaft 21 to, in effect, crank the follower about the axis of the pitpivot pin 83, thus moving the sector gear 82 to effect rotation of the mandrels 77. This only occurs during the interval between the transfer of a sleeve blank by the drum

76 to the adjacent mandrel 77 and the short period necessary to totally rotate the mandrel through slightly more than 360° to overlap the ends of the strip of material.

At the overlap of the material wound on the mandrel 77, an air nozzle will provide a flow of hot air and a tamper bar 87, shown in Figure 3, will be cammed by a cam 88 into engagement at the overlap area of the sleeve blank 89 shown in Figure 3. The seal tamper bar 87, of which there will be one corresponding to each of the mandrels 77, is supported on a pedestal 90 fastened to the upper surface of the turret 78. The heat-sealing of the sleeve material is accomplished in approximately 5°-30° of the rotation of the turret 78.

When the mandrel containing a sleeve has arrived at the point adjacent the starwheel 13 and a preheated bottle has been grasped by the chuck mechanism 16, a sleeve stripping ring 91 surrounding the mandrel 77 will begin its upward movement. This upward movement of the ring 91 is carried out by the reciprocation of a rod 92, which is fixed to a cam follower 93 adapted to ride on a stationary cam 94. The sleeve 89 is moved upward into the position shown in Figure 4, at which time the ring 91 will begin to be retracted. The lower end of the sleeve 89 will just clear an arcuate plate 94 that extends coextensively with respect to the arcuate heaters 66 and 67. This plate 94 prevents heat radiating from the heaters 66 and 67 from flowing down below the plate to interfere with the operation of the winding mandrels and material wound thereon which is positioned at the lower level of the turret 78.

The heaters 66 and 67 are formed of stainless steel cases with insulating board forming the surface facing the path of travel of the containers. The heater elements themselves are stamped, serpentine elements which are pinned to the insulating board. The inside heaters 67 have their steel cases provided with metal brackets 98, which may be attached to vertical plates 99 attached to a fixed plate or support 100. The slots shown in the bracket 98 and plates 99 are for purposes of adjustment of the inner heater 67, both in height and in assuring that the three units abut each other when in operating position. The outer heater elements 95 are supported by brackets 101, which are in turn fastened to a ring 102 by adjustable connectors 103. The ring 102 has a vertical rod 104 fixed to the back thereof, with the rod 104 extending up above the upper cross beam 28. The rod 104, of which there are more than one in the actual embodiment of the apparatus, is a mechanism by which the outside heaters 66 may be raised in order to provide access to the area between the two heaters. Obviously, this access is not limited, inasmuch as the outer heaters 95 can be raised above the chuck mechanism without disturbing any of the mechanism. While a single rod 104 is illustrated in Figures 1 and 3, it should be pointed out that the ring 102 will have a plurality of rods 104 connected thereto, and these rods will be supported from above by a lifting mechanism (not shown).

As perhaps best illustrated when viewing Figures 3 and 5, the arcuate heaters 66 and 67 extend about approximately 180° of the circumference of the handling system. The heaters each have seven serpentine elements formed thereon in vertical spaced array. The upper two elements are separately controlled to provide the radiant heat necessary to shrink the upper portion of the sleeve into engagement with the underlying bottle. The four elements immediately below are separately regulated to provide the required heat to shrink the sleeve in the center portion of the container, and the lower, single element is separately controlled and its function is to shrink the lower portion of the sleeve 89. As shown in Figure 4, the sleeve is in the position at which shrinkage begins, and to shrink this lower edge into underlying engagement with the heel and a portion of the bottom of the container, a single element is viewing this region. One problem encountered in shrinking the foamed shrinkable material onto the container is the fact that infra-red heaters, of which the heaters 66 and 67 of of this type, only shrink the material which is in direct view of the heaters. Thus, it can be seen that the material at the bottom of the bottle, as it begins to turn and shrink inwardly and upwardly, will pass outside the view of the heater element that is at the lower most position in the array of the heaters. To insure that the sleeve is uniformly shrunk and is brought into close underlying engagement with the bottom of the container, Applicant has found that it is important to have assistance in this area by providing a manifold 105, which is adapted to contain hot air.

As best seen in Figure 5, the manifold 105 is in the form of a tube that extends from adjacent the end of the heaters 66 to approximately midway of the length of the full three heater array 66. During the first one-third of the length of the manifold 105, it is provided with a series of radially-extending openings 106 shown in Figure 6. These openings will direct hot air radially toward the center of the turret machine at the approximate height of the manifold. The middle one-third of the length of this manifold 105 is provided with a series of two holes, with the holes 106 continuing and another set of holes 107 directed more upwardly as depicted in Figure 7. At approximately two-thirds of the distance or length of the manifold 105, the holes 106 are discontinued, but the holes 107 are continued to adjacent the end of the manifold. Figure 8 shows the continuation of the openings 107.

With this particular arrangement and with the manifold 105 carried below the heaters as illustrated in Figure 3 by a bracket 108, the containers, as they pass between the heaters 66 and 67, will begin to be shrunk into engagement with the containers, and as the containers arrive in the zone of the manifold 105, that portion of the sleeve which is below the heel of the container will be impinged by the hot air issuing through the openings 106, and this portion of the sleeve will begin to curl up and shrink relative to the bottom of the container. As the container continues along the path of travel, the air directed through the openings 106 will be impinging on less of the sleeve as the sleeve

moves upwardly into contact with the bottom of the container. However, the openings 107 will then come into play and hot air will impinge upon the bottom of the container itself, which therefore will insure the complete shrinkage of the sleeve into contact with the bottom area of the container.

While the foregoing description of the heaters with seven elements is disclosed in detail, it should be kept in mind that the height of the heater and the number of heating elements is related to the height of the sleeve being shrunk. The seven element heater disclosed is primarily for one liter size ware. In the case of 10 oz. or 16 oz. bottles with shrinkable sleeves applied, the heaters will have only four elements each, since the height of the sleeve is considerably less.

Turning now to Figure 9, there is schematically shown the configuration of the serpentine heater elements in the three sections of the outside heater 66 and the inside heater 67. As previously explained, these heaters are in three arcuate sections; however, in Figure 9 they are shown flattened. The first section of the heater 66 and the first section of the heater 67 have their elements connected in parallel and are controlled in the three vertical zones by the outputs from three thermocouples 109, 110 and 111. The thermocouple 109 is connected to a controller 112, and the controller 112 is connected to the two upper elements of the first sections of the heaters 66 and 67. The thermocouple 110 is connected to a controller 113. This controller 113 is connected to the four intermediate elements of both the heaters 66 and 67, but only the first sections thereof, and a third controller 114 is connected to the thermocouple 111, and also is connected to the two lower individual elements of the first section of the heaters 66 and 67. In this manner, each of the zones of the first section of the heaters is under control of a thermocouple and controller. The remaining four heater sections are connected together, with the top elements of the sections being connected in parallel, and each is controlled by a thermcouple as shown in Figure 9. A thermocouple 115 is monitoring the temperature of the upper two heater elements of the last two sections of both heaters 66 and67. A thermocouple 116 monitors the temperature of the center zone of the four heaters, while a thermocouple 117 monitors the bottom most zone of the last two sections of the heaters 66 and 67. Each of the thermocouples 115-117 is connected to a temperature controller which will control the current, and thus the temperature of all of the heater elements in the zones being monitored by the thermocouples. With the system under the control of the temperature controllers, it has been found that containers successfully have the sleeve heat shrunk thereon at various rates of bottles per minute.

As an example, with the top heaters in both the first section and the second and third sections set at 1100°F and the intermediate heaters in the second and third sections at 900°F, with the bottom heater in the first section at 1140°F and the bottom heater in the second and third sections at 1220°F, sleeves were successfully shrunk at a speed in the range of 200 to 275 bottles per minute. This was found to be satisfactory; however, when the hot air manifold was turned on, it was possible to achieve a rate in excess of 300 bottles per minute processed through the apparatus.

While the foregoing description is primarily directed to the placing and shrinking of sleeves on glass containers, it should be apparent that the invention would have utility in handling plastic containers or other objects that are susceptible to handling in the same manner as glass containers.

CLAIMS

1. Apparatus for applying sleeves of heat-shrinkable plastic to glass containers wherein the sleeves are formed from individual blanks of plastic having a thickness of from 1 to 15 mils, said individual sleeves being formed from said blanks on a turret containing a plurality of equispaced vertical, forming mandrels, a plurality of bottle neck-supporting and rotating carriers mounted above said turret with a carrier corresponding to each mandrel, the improvement comprising incoming and discharge starwheels mounted at one side of the turret, each starwheel having bottle-engaging pockets therein, an incoming conveyor formed of an open mesh, metallic top surface, means driving said incoming conveyor with bottles in series thereon to bring the bottles into engagement with a pocket in the incoming starwheel, means connected to said incoming starwheel for rotating said starwheel to carry bottles into the pickup area of the carriers on the turret, said discharge starwheel being rotatable at a bottle release area of said turret adjacent the incoming starwheel for moving bottles that are released by the carrier from the turret onto a discharge conveyor moving away from said turret, means carried by said mandrels for telescoping sleeves from the mandrels onto the bottles held by the carrier at the incoming area of the mandrel, means for rotating said carriers after the sleeve has been transferred to the bottle, a first series of arcuate infra-red heaters extending about the path of travel of bottles held and rotated by said carriers, a second series of arcuate infra-red heaters extending about the inside of the circular path of travel of the bottles held by the carriers, said heaters being of a length relative to the circumference of said path of travel so as to extend through an arc of 100-180 degrees of travel.

2. The apparatus of Claim 1 wherein said series of heaters comprises three separate arcuate sections of equal length, and means for controlling the heat output of each of said sections.

3. The apparatus of Claim 2, wherein each heater section is divided into three vertically separate horizontal zones and means connected to each zone for selectively controlling the heat output thereof.

4. The apparatus of Claim 3 wherein said arcuate heaters are each controlled by a thermocouple carried by each heater and connected to the power source for the electrical, infra-red heater section or zone.

5. The apparatus of Claim 1 further including an arcuate pipe positioned below the bottom heater sections and extending generally coextensive with a portion of the length of the sections of infra-red heaters, a source of hot air, said pipe having a plurality of openings formed therein directed toward the lower heel of the bottles held by the carriers.

6. The apparatus of Claim 5 wherein the hole pattern in said pipe is such that during the first part of the travel of the bottles the hot air impinges on the skirt of the sleeve that is extending below the heel of the bottle, and in the later part of the bottle travel, the hot air is directed upwardly toward the underneath of the heel of the bottle to effectively assure shrinkage of that portion of the sleeve that embraces the underside of the bottle.

7. The apparatus of Claim 5 wherein the hole pattern in said pipe is a first series of holes directed at the heel of the bottle, a second series of holes directed at the underside of the bottle and said series of holes being in overlapping relationship intermediate its length.

8. Apparatus for applying sleeves of heat-shrinkable plastics to glass containers, substantially as described with reference to the drawings.

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